NAVAL SHIPS' TECHNICAL MANUAL

CHAPTER 090

INSPECTIONS, TESTS RECORDS, AND REPORTS

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NOTE

THIS CHAPTER HAS BEEN REFORMATTED FROM DOUBLE COLUMN TO SINGLE COLUMN TO SUPPORT THE NSTM DATABASE. THE CONTENT OF THIS CHAPTER HAS NOT BEEN CHANGED.

CHAPTER 90

INSPECTIONS, TESTS, RECORDS, AND REPORTS

SECTION 1.
INSPECTIONS AND TESTS

090-1.1 BOARD OF INSPECTION AND SURVEY REQUIREMENTS

090-1.1.1 ACCEPTANCE TRIALS AND INSPECTIONS OF NEW CONSTRUCTION, CONVERSIONS, AND MODERNIZATIONS. Article 0321, **U.S. Navy Regulations,** requires that the President, Board of Inspection and Survey (INSURV), conduct acceptance trials and inspections of all ships, service craft, and boats before acceptance for naval service. Such trials and inspections are required for all new construction ships, service craft and boats, and certain other ships that have undergone major conversion or modernization. Acceptance trials details are contained in OPNAV and INSURV instructions, series 5420 and 9080.

090-1.1.2 MATERIEL INSPECTIONS OF ACTIVE AND INACTIVE SHIPS AND SERVICE CRAFT. As required by Title 10 U.S. Code 7304 and Article 0321, **U.S. Navy Regulations,** the INSURV Board shall:

1. Examine each naval ship at least once every 3 years, if practicable, to determine its materiel condition.
2. Report any ship found unfit for continued service to higher authority.
3. Perform other inspections and trials of naval ships and service craft as directed by the Chief of Naval Operations (CNO). Surveys are directed by CNO on an individual basis.

090-1.1.2.1 Materiel inspections are the basis for determining ship fitness for further service and the degree to which the ship is capable of carrying out assigned missions. These inspections may be conducted underway or in port. During a routine materiel inspection, a ship may be determined to be in such substandard condition that an unfit finding is indicated.

090-1.1.2.2 Nominations for materiel inspections of active ships are made by cognizant commanders. Inactive ships are inspected 4 to 6 months before routine drydocking, the schedule of which is submitted annually to the INSURV Board by the Commander, Naval Sea Systems Command (NAVSEA). Article 0783, **U.S. Navy Regulations** , requires Commanding Officer to report to the CNO, without delay, whenever the condition of the ships, or any department of the ships, warrants inspection by the INSURV Board.

090-1.1.2.3 The INSURV Board provides to each ship scheduled for a materiel inspection written guidance on the requirements and procedures that will apply to the inspection to be conducted. This information is forwarded sufficiently in advance of the scheduled inspection to provide for timely and effective preparation by ship force.

090-1.2 PROPULSION EXAMINING BOARD (PEB) REQUIREMENTS

090-1.2.1 GENERAL. Inspections by conventional PEBs have been established by the Atlantic and Pacific Fleet Commanders-in-Chief to ensure strict adherence to propulsion plant readiness standards and to ensure that

these plants are operated properly and safely. OPNAVINST 3540.4 establishes the PEBs, describes their authority and responsibility, designates membership, and prescribes administrative procedures.

090-1.2.1.1 When examining propulsion plants, each conventional PEB has the responsibility to:

a. Evaluate qualification levels of all propulsion plant personnel by applying appropriate engineering personnel qualification standards.

b. Witness and evaluate the conduct of propulsion plant evolutions using the installed Engineering Operations Sequencing System (EOSS) as a basic guide.

c. Inspect the materiel condition of the propulsion plant to ascertain its state of operational readiness, preservation, and cleanliness.

d. Review and evaluate administration of the ship Engineering Department and completeness and accuracy of all ship records relating to the propulsion plant.

090-1.2.2 TYPES OF PEB EXAMINATIONS. Two types of examinations will be conducted by the PEB.

090-1.2.2.1 Initial Light-Off Examination. The initial light-off examination is conducted under any of the following circumstances:

a. Before lighting the first fire in any boiler, or first light-off of a main or auxiliary gas turbine

b. Following major conversion of a ship

c. On a ship qualifying for fitting out availability

d. On a ship with restricted availability in excess of four months.

090-1.2.2.1.1 The PEB ascertains the state of training of propulsion plant personnel, the adequacy of administrative procedures, and the materiel readiness of the propulsion plant machinery spaces as they affect impending propulsion plant operations. Propulsion plant drills are not required to be conducted as part of this examination. For example, simple evaluation of boiler water and feedwater, fuel sampling and analysis, as applicable, and casualty control walk-through drills may be conducted at the discretion of the Senior PEB Board Member conducting the examination.

090-1.2.2.2 Operational Propulsion Plant Examination (OPPE). An OPPE examination is conducted under any of the following circumstances:

a. Within 6 months after the end of a regular overhaul.

b. On a ship with restricted availability in excess of four months.

c. On a ship undergoing major conversion.

090-1.2.2.2.1 The current interval between subsequent examinations shall be approximately 18 months. The ultimate goal is to conduct examinations on an annual cycle.

090-1.2.3 EXAMINATION EVALUATION. At the conclusion of each examination or reexamination, a message reporting the results will be sent by the Senior Examining Board Officer to action and information addresses considered appropriate by the respective Fleet Commander-in-Chief. If the examination evaluation is unsatisfactory, or if the evaluation is conditionally satisfactory, and a suspension of or restriction from normal operations is directed, the Fleet Commander-in-Chief will advise CNO of the nature of the limitation with copy to supporting commands the Fleet Commander considers appropriate.

090-1.2.4 ADMINISTRATION OF PEB EXAMINATIONS. Following completion of a PEB examination, the Board will submit an official written report on its findings to the cognizant Fleet Commander-in-Chief (CINCPACFLT or CINCLANTFLT, or CINCUSNAVEUR for ships home-ported in Europe), with copies to the Type Commander, appropriate Administrative Commander (COMSIXTHFLT for ships examined in the Mediterranean), immediate Unit Commander, and the examined ship. A copy of the report of findings will be forwarded by the Fleet Commander-in-Chief to the Chief of Naval Operation the Chief of Naval Material, the Commander, NAVSEA, and the Commander, Naval Safety Center (when appropriate) as soon as practicable. In any case the report shall be submitted within 30 days of the examination. In this report, the overall evaluation of propulsion plant readiness will be reported following the criteria described in the following paragraphs.

090-1.2.4.1 Satisfactory - Ready for Unrestricted Operations or for Light-Off. A ship may be found **Satisfactory Ready for Unrestricted Operation or for Light-Off** even though minor deficiencies reduce the effectiveness of the propulsion plant, as long as the deficiencies do not appreciably affect ship ability to safely conduct those propulsion plant operations appropriate to ship mission or maintenance status.

090-1.2.4.2 Conditionally Satisfactory - Operational Limitation Recommended. A ship will be found **Conditionally Satisfactory - Operational Limitation Recommended** if deficiencies noted are of such significance that authorization to continue propulsion plant operations should be subject to specific limitations. The examination message or written report will identify the deficiencies (or aggregate deficiencies) that must be corrected in order for the ship to attain a satisfactory evaluation, and will recommend specific operational limitations as appropriate.

090-1.2.4.2.1 A ship found **conditionally satisfactory** as a result of an initial light-off examination or an operational propulsion plant examination may conduct plant operations, but must correct the restrictive deficiencies before the operational limitation are lifted. Reexamination requirements following a finding of **conditionally satisfactory** will be as directed by the Fleet Commander-in-Chief.

090-1.2.4.3 Unsatisfactory - Not Certified for Propulsion Plant Operations. A ship will be found **Unsatisfactory - Not Certified for Propulsion Plant Operations** if deficiencies noted are of such significance that propulsion plant operations are considered unsafe. The PEB report will identify the deficiencies (or aggregate deficiencies) that resulted in the finding and must be corrected in order for the ship to attain a safe-to-operate status.

090-1.2.4.3.1 A ship found **unsatisfactory** as a result of an initial light-off examination must be reexamined by the PEB and found **satisfactory** or **conditionally satisfactory** before the plant is lighted off. An operational propulsion plant examination must have approval from the cognizant Fleet Commander-in-Chief before the plant is lighted-off and must satisfactorily (or conditionally satisfactorily) pass a reexamination by the PEB before the propulsion plant is returned to **unrestricted** or to **limited operational** status. Procedures preparatory to reexamination will be prescribed by the respective Fleet Commanders-in-Chief.

090-1.2.4.3.2 It is considered essential that a ship successfully complete an initial light-off examination. A subsequent satisfactory OPPE is considered essential before a ship is certified as fully ready for fleet operations or sails on deployment. Following an initial light-off examination, if a ship must be deployed before completion of the operational propulsion plant examination, CNO and the immediate Unit commander under whom the ship will be operating will be informed of the operational limitations that will be imposed until removed by the fleet Commander-in-Chief. Joint approval of CINCLANTFLT and CINCUSNAVEUR is required to deploy to the Mediterranean area any ship that has not passed an OPPE. Except for ships homeported in the Mediterranean, OPPE will not normally be conducted on ships under the control of CINCUSNAVEUR.

090-1.2.4.3.3 Reports of corrective action subsequent to an examination will be submitted as specified by the Fleet Commander-in-Chief, with information copies forwarded to CNO and NAVSEA.

090-1.3 PLANNED MAINTENANCE SYSTEM (PMS)

090-1.3.1 The Navy has implemented an integrated maintenance management program, referred to as the 3-M System, which operates under policy guidance by CNO. The 3-M System is described in OPNAVINST 4790.4; the PMS is described in volume I. The PMS has been developed to provide each ship, department, and supervisor with the tools to organize, schedule, and control planned maintenance effectively.

090-1.4 SHIP SYSTEM AND SUBSYSTEM INSPECTIONS

090-1.4.1 SPECIFIC INSPECTIONS. The following paragraphs summarize the specific inspections imposed on forces afloat that involve ship systems and subsystems under the cognizance of NAVSEA.

090-1.4.1.1 Combat System Readiness Review (CSRR) and Combat System Readiness Test (CSRT). Prior to deployment, Atlantic ships undergo the CSRR, which is a dedicated two-week effort. Pacific ships undergo the CSRT, which requires five to seven working days, depending on ship class. COMNAV SURFLANTINST 9000.1 describes the CSRR; COMNAVSURFPACINST 4700.1 describes the CSRT. The CSRR and CSRT are conducted as scheduled by the applicable Type Commander. The objectives of these tests are:

a. To use PMS to ascertain the materiel readiness of the ship combat system

b. To determine the ability of ship personnel to maintain and test elements of the combat system using the PMS

c. To assist ship personnel in determining the validity of the software support for the installed combat system.

090-1.4.1.2 Weapon System Accuracy Trials (WSAT). WSATs are conducted on selected Anti-Submarine Warfare (ASW) ships following new construction and overhaul to demonstrate the ability of the ASW weapon system to meet specified system standards of performance. Trial results are used as a basis for ASW weapon system certification. The WSAT Test Coordinator is responsible for coordinating the scheduling efforts of the WSAT team, the Fleet Commander, and the Type Commander.

090-1.4.1.3 Combat System Ship Qualification Trials (CSSQT). CSSQTs are performed subsequent to a new ship delivery, and overhaul of active fleet ships, to assist the Commanding Officer of each ship in stabilizing the operational readiness on the ship combat system and support systems. Systems included in the CSSQT are:

a. Surface missile system

b. ASW system

c. Gun system

d. Search radar

e. Command and control

f. Communications system

g. Electronic warfare system

h. Central dry air system

i. Coolant system

j. Underway replenishment system (weapons)

k. Navigation system.

The CSSQT period is assigned by the Fleet Commander, and is conducted in accordance with NAVSEAINST 9093.1. The ship Commanding Officer and the Type Commander are responsible for scheduling tests and demonstrations.

090-1.4.1.4 Fleet Operational Readiness Accuracy Check Sites (FORACS). FORACS tests have developed to determine ship sensor equipment accuracies with minimum use of ship time. Two separate test periods are necessary to accomplish the task. The first period requires approximately six to eight hours while the ship is moored. The second period is the on-range test phase, which normally requires eight to ten hours at the test range.

090-1.4.1.4.1 The dockside test period includes a determination of ship centerline, measurement of the ship gyrocompass settled error, and briefing of officers and key sensor equipment operators. The on-range test period uses three precision-surveyed optical tracking stations to locate a point on the ship at any given instant. Ship heading is determined by calculations based on relative bearing to a surveyed target measured by an engineer's transit located on the centerline. Targets include tunable sonar targets, passive and active radar targets, and various optical targets.

090-1.4.1.4.2 Normally, FORACS range data are processed the morning following the test and engineers begin an analysis of results. Within 24 hours a preliminary report is sent to the ship and respective Type Commander. Within two weeks a formal report is published containing the test results in graphic form and an analysis of the errors.

090-1.4.1.4.3 FORACS ranges serve the Pacific and Atlantic Fleets. FORACS I, located on San Clemente Island, serves the West Coast Pacific Fleet. FORACS II, located at St. Croix, U.S. Virgin Islands, serves the Southeastern Atlantic Fleet. FORACS III, located at Nanakuli, Hawaii, serves the Mid-Pacific Fleet and transit ships. FORACS IV, located at Fiskers Island, New York, serves the Northeastern Atlantic Fleet and FORACS V, located at Atlantic Underwater Test and Evaluation center (AUTEC), Andros Island, Bahamas, also serves the Southeastern Atlantic Fleet.

090-1.4.1.5 Ship Electronic System Evaluation Facility (SESEF). SESEFs are used to evaluate the performance of Electromagnetic (EM) transmitting and receiving portions of the combat system and to evaluate the ground wave propagation characteristics of the associated antennas. The SESEF tests include operational readiness assessment, diagnostic testing and antenna radiation pattern measurements for equipment such as radio communications, search and fire control radars, radio direction finders, Tactical Air Navigation (TACAN), passive and

active electronic countermeasures, and Identification Friend or Foe (IFF). The tests are performed at the completion of the yard period (new construction, modernization, overhaul) and underway materiel inspection or fleet support, to validate engineering design criteria, and, on follow ships, to verify conformance to lead ship design criteria. For SESEF details, see NAVSEAINST 3520.1.

090-1.4.1.6 Other Post-Delivery Trials. Other post-delivery trials usually conducted following ship construction or complex overhauls include: structural test firings, shock tests, performance and special trials, and acoustic trials.

a. Structural test firings are conducted to determine if personnel hazards exist, and to confirm that the ship ordnance and structures are of adequate strength, tightness, and heat resistance to withstand the shock, vibration, and blast generated by firing of ship weapons.
b. Shock tests are full-scale, controlled tests of the underwater shock resistance of the hull, machinery, and payload equipment. The tests usually consists of several detonations or shots of increasing shock intensity. Intermediate level shots may include two shots of equal intensity, but from the port and starboard sides.
c. Performance and special trials are designed to test the performance of the hull and the propulsion and control systems. The trials include: standardization trials, tactical trials, maneuvering trials, acceleration and deceleration trials, trailed and locked shaft trials, underway vibration trials, fuel economy trials, and miscellaneous tests and trials. The EM-log is calibrated at the start of this trial period in order to make speed data available for the trials.
d. Acoustic trials are conducted to determine ship noise characteristics to define and identify noise sources, to determine acoustical detection capabilities of installed sensors, and develop noise reduction methods.

090-1.4.1.6.1 The shock tests, performance and special trials, and acoustic trials are conducted on the lead ship for new construction ship programs. Structural test firings are conducted on any ship that has new gun or missile systems installed. More details on ship trials are provided in **NSTM Chapter 094, Trials** .

090-1.4.1.7 Electromagnetic Compatibility (EMC). EMC is the capability of EM equipment or systems to operate in a fixed environment within design levels of performance without degradation caused by EM radiation. EMC is associated with Electromagnetic Interference (EMI), which is electromagnetic energy that interferes with the detection and analysis of a desired signal or causes a malfunction in equipment. It is also related to other programs such as Radiation Hazards of Electromagnetic Radiation to Ordnance (HERO), and Hazards of Electromagnetic Radiation to Fuels (HERF).

090-1.4.1.7.1 Shipboard EMI surveys are conducted on new construction, modernization, overhaul, and conversion ships by NAVSEA in accordance with MIL-STD-1605 in order to determine the compatibility of EM equipment with its shipboard environment. In order to conserve at-sea test time, an EMI survey is normally conducted in two phases, one dockside and one at sea.

a. Phase I of the EMI survey is conducted dockside and consists of measuring EMI radiations from selected energized electrical equipment with a field intensity meter placed three feet from the equipment. Equipment whose radiations exceed a certain specified level are retested during Phase II.
b. Phase II of the EMI survey is conducted at sea when the ship is in a typical operating configuration. It consists of energizing certain active electromagnetic equipment that failed Phase I, such as radar and communications transmitters, while monitoring certain nonactive equipment such as receivers. EMI that exceeds a certain level is required to be corrected before the ship is delivered to the Navy.

090-1.4.1.7.2 RADHAZ, HERO, and HERF are usually conducted at sea during the EMI surveys, and involve making Radio Frequency (RF) field intensity and power measurements to establish or check for RADHAZ, HERO, and HERF potentially hazardous zones. See OPNAVINST 2410.31 for EMC requirements within the Department of the Navy.

090-1.4.1.8 Fleet Electromagnetic Readiness (FEMR) Program. Under the FEMR program, teams of technical personnel with EM expertise are provided to assist INSURV in performing EM readiness inspections of ship systems in relation to EMC characteristics. These INSURV readiness inspections are usually performed on new construction, conversion, and overhaul ships to the Navy. During the INSURV EM inspections, pertinent data are taken from various equipments by the FEMR team for ship design analytical studies. The data taken, which is not limited to RF equipment, involve system performance and degradation relating to ship topside design under operational conditions. The analytical studies are made in order to determine operational effectiveness of the ship system and to recommend design changes that will lead to optimum effectiveness.

090-1.4.1.9 Shipboard Electromagnetic Compatibility Improvement Program (SEMCIP). The primary objective of SEMCIP is the development of interim and long-range solutions to existing and potential EMC problems for the active fleet. SEMCIP is formulated into specialized discipline areas, which are: SEMCIP Engineering, Waterfront Corrective Action Program (WCAP), and Industrial EMC (IEMC).

a. SEMCIP Engineering is the engineering and problem resolving arm of SEMCIP. It provides technical teams to test, evaluate, and develop corrections for EMI problems on a quick-fix basis for individual cases, or on a full-scale, EMC-evaluation basis, for total platform resolution.

b. WCAP is the **groom-and-correction** area of SEMCIP. It takes advantage of lessons learned by SEMCIP Engineering and installs SEMCIP-approved corrections to solve identified problems in operational ships and provides training to the ship force in proper EMC maintenance procedures. WCAP refers new or unique problems to SEMCIP Engineering for analysis and resolution.

c. IEMC is the portion of SEMCIP that develops standardization of EMC corrective measures for the ship construction, modernization, overhaul, and repair processes. It also provides manufacturing capability for prototype development and testing of proposed EMC corrective devices or materials.

d. Lessons learned by SEMCIP Engineering, WCAP, and IEMC are transmitted to the equipment design and acquisition cycles through the EMC Design Feedback (EMCDF) activity of SEMCIP in the form of quick-fix problem research reports and periodic reports of problems encountered in the field, resolutions, and recommendations for follow-on designs.

090-1.4.1.10 Shipboard Visual TEMPEST Inspections. Shipboard Visual TEMPEST Inspections involve the inspection of ship Secure Electrical Information Processing Systems (SEIPS) by one or more qualified Field Technical Authorities (FTAs). These inspections are used to evaluate ship compliance with the installation criteria as set forth in MIL-STD-1680. These criteria establish measures to be taken through physical and electrical security means in order to diminish the possibility of compromising emanations.

a. The physical security aspect of the Shipboard Visual TEMPEST Inspection involves the use of physical barriers to:
   1. Physically protect classified information and materials.
   2. Assist in the operational control of equipment.
   3. Prevent inadvertent compromises.

4. Maintain the cryptographic equipment security level by examining bulkheads, locks, safes, alarms, doors and other openings and installed operational safeguards to determine their compliance with the physical security requirements for the SEIPS.

b. The electrical security aspect of the Shipboard Visual TEMPEST Inspection involves an evaluation of the ship state of compliance with MIL-STD-1680 criteria in providing adequate safeguards against the release of compromising emanations by inadvertent radiation from the SEIPS. Bonding, filtering, shielding, isolation, grounding, and equipment locations receive special attention during the Shipboard Visual TEMPEST Inspections.

090-1.4.2 INSPECTION SAFETY HAZARDS AND PRECAUTIONS. Requirements for ship safety program and organization provide for roving inspectors who check for hazards and risks that could result in personal injury or equipment damage, and submit safety hazard reports. These requirements are included in OPNAVINST 3120.32, **Standard Organization and Regulations of the U.S. Navy** . Inspection frequency is established by Operational Commanders. Results shall be recorded through the 3-M System or as required by NAVSEA and the Operational Commanders.

090-1.4.2.1 General. Necessary repairs indicated by these inspection reports shall be entered in the Current Ships Maintenance Project (CSMP), according to paragraph 090-2.1.3.

090-1.4.2.1.1 The following paragraphs describe precautions that shall be taken by inspectors, as well as ship force personnel under various hazardous conditions.

090-1.4.2.2 Entering Closed or Poorly Ventilated Spaces. Precautionary measures shall be taken, as specified in **Chapter 074 volume 3, Gas Free Engineering** , before personnel may enter spaces that are not well ventilated, have been closed for an appreciable length of time, or have contained flammable or explosive materials. Unventilated storerooms, blisters, double bottoms, tanks, cofferdams, pontoons, voids, magazines, idle furnaces, and cold boilers are typical. The Gas Free Engineer, qualified as directed in **NSTM Chapter 074 volume 3, Gas Free Engineering** , shall indicate whether safety rules are applicable in a given situation and which precautionary measures, if any, are needed.

090-1.4.2.3 Emergency Entry into Closed or Poorly Ventilated Spaces. In case of emergency, when it is necessary for an inspector to enter a compartment or tank not certified to be gas free or not certified to contain sufficient oxygen, the inspector shall be equipped with an airline mask or an oxygen breathing apparatus with a securely fastened line. The line is to be held by attendants outside who shall be prepared for rescue if necessary. Attendants shall ensure that this line does not become fouled. When an air line mask is used, the hose shall be attached to a source of air fit for breathing (not to an oxygen cylinder), and a slight positive pressure shall be maintained in the hose and facepiece.

090-1.4.2.4 Inspection of Areas in Way of Flammable or Explosive Materials. Before inspectors enter areas where hot work (such as welding and cutting) is being done, the Gas Free Engineer shall inspect the area and indicate any precautionary measures needed.

090-1.4.2.5 Entering Submarine Battery Tanks. Refer to **NSTM Chapter 223, Submarine Storage Batteries** , for precautions required for entering submarines battery tanks.

090-1.4.2.6 Precautions Against Electric Shock. Inspectors of areas where portable tools, electric appliances, and other electric equipment are used shall take precautions to avoid electric shock. NAVSEA 0900-LP-007-9010, **Electric Shock - Its Causes and Its Prevention** , should be consulted. Safety precautions also appear in various Naval Ship's Technical Manual (NSTM) chapters that deal with electrical equipment, particularly **NSTM Chapter 300, Electric Plant General** . Additionally, OPNAVINST 5100.19, **Navy Safety Precautions for Forces Afloat** , should be consulted.

090-1.4.3 INSPECTION OF INFREQUENTLY ENTERED SPACES. Frequently entered spaces are inspected on a regular schedule; however, some infrequently entered spaces are inspected only when considered necessary by the Operational Commander. The special precautions observed prior to entering or working such spaces are described in paragraphs 090-1.4.3.1 through 090-1.4.3.3.

090-1.4.3.1 Double-Bottoms, Voids, Cofferdams, and Ballast Tanks. Unless special inspections are necessary at more frequent intervals because of unusual conditions or because of suspected unsatisfactory conditions, ballast tanks (except ballast tanks used also for fuel) and unused double-bottom tanks, voids, and cofferdams shall be inspected at scheduled drydockings. Specific attention shall be given to inspecting tank sounding tubes and striker plates. There have been instances where a sounding bob has worn a hole, first through the striker plate and then through the hull plating. For inert gas-filled cofferdams, inspections are required only during scheduled drydockings or when work is necessary. In instances where severe corrosion is present upon inspection and corrective measures are taken, the affected space shall be reinspected six months later to ensure that corrosion has not recurred. Maintenance Requirement Cards (MRCs) shall be used where applicable and pertinent materiel conditions reported on OPNAV Form 4790/2K.

090-1.4.3.2 Freshwater and Reserve Feed Tanks. Double bottoms and tanks ordinarily filled with fresh water (including associated check valves in tank overflow piping, sounding tubes, striker plates, and terminals of air escape piping) shall be inspected at a naval shipyard during scheduled drydockings or when emptied and opened for any purpose. Information regarding the materiel condition of these tanks and associated structures should be recorded on OPNAV Form 4790/2K for inclusion in the Maintenance Data System.

090-1.4.3.3 Fuel Tanks and JP-5 Fuel and Gasoline Tanks. Instructions for detailed inspection of fuel tanks are contained in **NSTM Chapter 541, Ship Fuel and Fuel Systems** , and for JP-5 fuel and gasoline tanks in **NSTM Chapter 542, Gasoline and JP-5 Fuel Systems** . MRCs shall be used where applicable.

090-1.4.4 INSPECTION FOR CORROSION. Visual inspection of most compartments or machinery for corrosion will indicate whether corrosion-related base metal deterioration has occurred. If the metal is coated with paint or some other corrosion-resistant material, inspection can indicate the extent of coating failure. If a partial failure is in evidence, the inspector will determine the percentage of ineffective coating and the extent of corrosion deterioration of base metal. **NSTM Chapter 631, Preservation of Ships in Service (Surface Preparation and Painting),** gives criteria for identifying coating failures.

090-1.4.4.1 General. Nondestructive testing to determine the extent of corrosion damage shall be performed where the visual examination indicates damage that could affect system operation. If nondestructive testing is required to support the visual inspection, consult **NSTM Chapter 074 volume 2, Nondestructive Testing of Metals, Qualification and Certification Requirements for Naval Personnel (Non-Nuclear),** for general guidance on the extent of damage permitted before repair is required. The fact that inspected metal surfaces show indications of corrosion attack shall be cause for implementing corrosion control procedures as described in **NSTM Chapter 631** or corrosion repairs in **NSTM Chapter 074 volume 2,** or both, as appropriate.

090-1.4.4.2 Electrochemical Corrosion. It is vital for inspection personnel to identify the type and extent of corrosion so that appropriate action can be taken to prevent catastrophic failure. Most ship corrosion is electrochemical and occurs in the presence of an electrolyte such as seawater. It is usually accelerated in areas where dissimilar metals are in proximity. Further information on characteristics of electrochemical corrosion are available in **NSTM Chapter 633,** Cathodic Protection. Categories of types of corrosion most common to naval ships are described in paragraphs 090-1.4.4.3 through 090-1.4.4.9.

090-1.4.4.3 General Corrosion Attack. General corrosion attack is usually associated with a uniform surface deterioration over an extensive area.

090-1.4.4.4 Pitting. Pitting attack on a metal surface takes the form of deep cavities of small diameter. It may be localized, or may cover larger areas. Pitting may be found on both ferrous and nonferrous metals and their alloys.

090-1.4.4.5 Exfoliation Attack. Exfoliation attack is a type of corrosion deterioration resulting in separation of a metal into thin layers or foils, which can usually be peeled from the surface.

090-1.4.4.6 Galvanic or Dissimilar Metal Corrosion Attack. When two dissimilar metals, such as aluminum and steel, are coupled together and subjected to a corrosive environment (such as water, salt spray, stack gas, or cleaning solutions), the more active metal (aluminum) becomes the anode and corrodes through exfoliation or pitting.

090-1.4.4.7 Stress Corrosion Cracking. Stress corrosion cracking results from the simultaneous action on a susceptible metal or alloy of a sustained static load and a corrosive environment. It is particularly characteristic of high strength aluminum alloys, certain low strength alloys, and high strength steels. Cracks may be intergranular (along grain boundaries) or transgranular (across grains).

090-1.4.4.8 Fretting Corrosion. Fretting corrosion (high impingement or abrasion) is a type of attack that takes place when two heavily loaded surfaces in contact with each other (usually machinery parts) are subjected to either slight vibration or oscillation. The small particles that are constantly being removed from the rubbing surfaces create the abrasive action responsible for the corrosion attack.

090-1.4.4.9 Crevice Corrosion. Crevice corrosion is usually a pitting attack caused by the greater concentration of dissolved oxygen in an electrolyte such as water, seawater, or cleaning solutions trapped in a crevice, compared to the concentration of dissolved oxygen in the rest of the electrolyte.

090-1.4.4.10 Detection of Corrosion Attack. The occurrence or frequent recurrence of electrochemical corrosion attack in any particular compartment or specific piece of equipment or hardware is generally attributable to the presence of an electrolytic solution (seawater). Corrosion inspection shall therefore be conducted with great care in those places where certain environmental or design characteristics aggravate the corrosion problem. Some adverse features of these design characteristics will usually involve:

a. Seawater splash

b. Sea (salt) spray

c. Poor drainage

d. High humidity or poor ventilation

e. Dissimilar metal connections

f. High impingement or abrasion.

090-1.4.5 CRITICAL INSPECTION AREAS. Examples of corrosion-susceptible areas are described in paragraphs 090-1.4.5.1 through 090-1.4.5.6. Not all shipboard areas with potential corrosion problems are included.

090-1.4.5.1 Bilges (Fire Rooms, Engine Rooms, Diesel Engine Rooms, Pumprooms). Because of high humidity, seawater, and corrosive solutions present in bilges, it is important that control inspections be made regularly. Components and equipment requiring careful attention include:

a. Suction Pumps

b. Foundations and machinery supports

c. Boiler air casings

d. Galvanic anodes.

090-1.4.5.2 Galley and Scullery. Structures and equipment in galleys and sculleries are susceptible to electrochemical corrosion attack. Joined dissimilar metals, in particular, should be carefully inspected.

090-1.4.5.3 Tanks and Voids. Under ordinary conditions all voids, cofferdams, and double-bottom compartments, except those specially fitted or designated for carrying reserve feed, ballast water, fuel, diesel oil, or lubricating oils, shall be kept dry as much as practicable. These areas are normally protected by organic coatings and shall be inspected for paint failure such as flaking, blistering, peeling, and general lifting. The substrate metal surface shall also be inspected for corrosion. For this purpose, a knife or sharp instrument may be used to lift the paint to determine if the rate of corrosion attack on the underlying metal is accelerating.

090-1.4.5.4 Shaft Alley. Particular emphasis shall be placed during shaft alley inspections on:

a. Pump suction

b. Bearing and machinery foundations

c. Restricted and nondraining areas.

090-1.4.5.5 Oilers. In oilers, doublebottom compartments, except those designated for carrying reserve feed water, ballast water, fuel, diesel oil, or lubricating oils, shall routinely be kept dry. Use of these compartments for storage of additional fresh water or for seawater ballast for trimming purposes shall be avoided except in cases of necessity. Cofferdam compartments shall be kept dry except where directed and approved. Cofferdams adjacent to cargo gasoline tanks will be kept completely filled with fresh water; this water should be slightly alkaline to minimize corrosion. This prevents seepage of gasoline into the cofferdams when gasoline cargo is carried. It also prevents the accumulation of gasoline vapor in the cofferdam even when the tanks are empty. This precaution shall be taken whether the gasoline tanks are full or empty. The carrying of fresh water in the cofferdam between cargo fuel tanks and a fire room is permissible if necessary to prevent oil leakage or to enhance fire protection. The water shall be maintained at such height in cofferdams as the Commanding Officer deems necessary.

090-1.4.5.6 Miscellaneous Areas. In addition to the corrosion-susceptible areas listed, other spaces, areas, compartments, hardware, and equipment requiring critical scrutiny for corrosion attack include:

a. Aluminum bulkhead stiffeners

b. Aluminum and steel joints (interior wet spaces and exterior)

c. Aluminum decking (exterior and interior), fan rooms, and underneath deck tile

d. Pipe bulkhead penetrations

e. Pipe and wire clamps

f. Safety rail fittings

g. Helicopter deck tiedown fittings

h. Certain areas directly exposed to stack gases, such as radar supports.

090-1.4.6 WATERTIGHT INTEGRITY TESTS. A planned program for conducting watertight integrity tests and inspections shall be instituted so that all spaces are covered during an operating cycle, including a routine shipyard overhaul. **NSTM Chapter 079 volume 4, Compartment Testing and Inspection,** specifies types and cycles of testing. A mandatory schedule in the form of a plan of watertight integrity tests and inspections has been prepared by NAVSEA for most ships. A compartment shall not be air-tested unless specified in this schedule.

090-1.4.7 INSPECTION OF SAFETY DEVICES. Mechanical, electrical, or electronic safety devices, installed for the protection of machinery equipment or personnel, shall be inspected at suitable regular intervals in accordance with PMS and whenever warranted by unusual circumstances or conditions. Whenever practicable, such inspection shall include operation of the safety device while the equipment or unit is in actual operation.

090-1.4.8 INSPECTION BY A SHIPYARD. Examination of a structure by a shipyard, and the required reports, are to be in accordance with **NSTM Chapter 100, Hull Structures.** Materiel Inspections required during drydocking and the required reports are listed in **NSTM Chapter 997, Docking Instructions and Routine Work in Drydock.**

090-1.4.9 INSPECTION OF WOOD HULL SHIPS. Inspection of wood-hull ships is covered in **NSTM Chapter 100,** Hull Structures.

SECTION 2.

RECORDS

090-2.1 SHIPS' MAINTENANCE AND MATERIAL MANAGEMENT (3-M) SYSTEM

090-2.1.1 GENERAL. The Ships' Maintenance and Material Management (3-M) Manual has been promulgated (OPNAVINST 4790.4) to assist Navy Commanders and managers to attain and maintain readiness in the fleet. Included in the 3-M system are the Planned Maintenance System (PMS), which delineates preventive maintenance requirements, and the Maintenance Data System (MDS), which provides the means for recording maintenance data by automatic data processing equipment. The main objective of the Navy record system is to

improve record keeping through standardization, automation, speed, and efficiency. Although additional records and reports are required, the 3-M system is the main vehicle for recording and reporting equipment maintenance data.

090-2.1.2 MAINTENANCE DATA SYSTEM. With the implementation of the MDS, the materiel history is provided to each ship by the Type Commander in the form of Automatic Data Processing (ADP) reports.

NOTE

As an exception to the foregoing, nuclear powered ships and tender reactor plant materiel history data shall be recorded and retained in accordance with NAVSEAINST 9210.37.

090-2.1.2.1 The MDS provides documents on which personnel record, at the maintenance source, information concerning corrective or deferred maintenance action tests and alterations. The basic procedures and criteria for reporting are described in the 3-M Manual (OPNAVINST 4790.4) as supplemented by Type Commander directives.

090-2.1.2.2 In addition to the coded information reported through MDS, the materiel history will also contain any narrative remarks as reported on OPNAV Form 4790/2K. For example, clearances and tolerances or other readings would be reported in this section. With this narrative remark capability, the machinery history reports are comprehensive, and requirements are usually determined by the Department Head. The remarks should not include routine readings and measurements if such readings and measurements are normal and are not taken in conjunction with a casualty or equipment malfunction.

090-2.1.2.3 The narrative capability of the MDS precludes further entries in the materiel history card file except those required by the Type Commander. Where records have been kept on materiel history cards, the Type Commander should ensure that no data is destroyed and that data continuity is maintained.

090-2.1.3 CURRENT SHIP MAINTENANCE PROJECT (CSMP). The CSMP is the basic management tool for monitoring all outstanding repairs and alterations. The purpose is to provide shipboard maintenance managers with a consolidated listing of deferred corrective maintenance in order to facilitate orderly planning of ship, tender, and shipyard work. With the implementation of the MDS, the CSMP is a composite of ADP printouts based on deferred maintenance items submitted by the ship on OPNAV Form 4790/2K. Basic procedures for reporting deferred maintenance are contained in OPNAVINST 4790.4.

090-2.1.4 DISPOSAL OF MATERIEL HISTORY AND CSMP CARDS. Materiel history cards with historical maintenance and field change entries shall be retained and shall accompany equipment being transferred. No additional entries are required, except as directed by the Type Commander. Outstanding deferred maintenance entries on CSMP cards shall be transferred to MDS, under OPNAV Form 4790/2K, for submittal to the Type Commander. After entries have been transferred, and the information has appeared on an automated CSMP, the CSMP cards may be destroyed. In nuclear powered ships and tenders, retention and disposition of materiel history records shall be in accordance with NAVSEAINST 9210.37.

090-2.1.5 SHIP EQUIPMENT CONFIGURATION ACCOUNTING SYSTEM (SECAS). The SECAS Program is responsible for maintaining the Navy's central ships' configuration status accounting file, which is part of the Weapon Systems File (WSF) reposited at the Navy Ships Parts Control Center (SPCC), Mechanicsburg, PA. The

WSF includes all hull, mechanical and electrical, ordnance, and electronics equipment installed or in use on all active and reserve fleet ships. This file is initially generated during ship construction and is subsequently maintained by the SECAS Program throughout the ship life cycle. The file is maintained by three methods:

a. Ship submittal of Configuration Change form, OPNAV 4790/CK, in accordance with OPNAVINST 4790.4

b. SECAS on-site validations of selected equipment

c. Input by industrial activities of changes made during availabilities.

Data provided by the SECAS file is used by all levels, and a wide variety of Navy managers, to support the ship. SECAS data is required to determine the logistic support necessary to support the ship such as repair parts, test equipment, technical manuals, and PMS documentation. Industrial activities require ship configuration data to plan overhauls and repairs. Operational managers and involved activities use this configuration data in determining training and manpower requirements. Detailed information on ship involvement and support of SECAS is contained in NAVSEA T0752-AA-MAN-040/SECAS, **Ships Equipment Configuration Accounting System (SECAS) Program Manual, Volume 4, Shipboard Operation;** instructions for the preparation of OPNAV Form 4790/CK are included in OPNAVINST 4790.4.

090-2.2 ENGINEERING DEPARTMENT RECORDS AND ACCOUNTS

090-2.2.1 GENERAL. Although the primary vehicle for record keeping aboard ship is the 3-M system (paragraph 090-2.1.1), certain legal records required by law and certain other records required by the Type Commander must also be maintained.

090-2.2.2 LEGAL RECORDS. Two engineering records required by law are described in paragraphs 090-2.2.2.1 through 090-2.2.2.2.

090-2.2.2.1 Engineer's Bell Book. The Engineer's Bell Book (NAVSEA 3210/1) is a record of events made at the time they occur. Instructions for the use of the Engineer's Bell Book require that the propeller speed recorded must be the Revolutions Per Minute (r/min) required by an order directing a change in propeller speed, not the r/min that results from the order.

090-2.2.2.1.1 Before going off duty, the Engineer Officer-of-the-Watch (EOOW) must sign the Bell Book in the line following the last entry for that watch, and the next EOOW shall continue the record immediately thereafter. In machinery spaces where no EOOW is stationed, this record must be signed by the Senior Petty Officer-of-the-Watch (SPOOW). Alterations or erasures of the Engineer's Bell Book are not permitted. An incorrect entry must be corrected by drawing a single line through it and making the correct entry on the following line. Such deleted entries must be initialed by the EOOW, SPOOW, or in the case of ships or craft equipped with controllable reversible pitch propellers, by the Officer-of-the-Deck (OOD), as appropriate.

090-2.2.2.1.2 The records for each throttle control station for each day shall begin with a new sheet, and the day's records for all stations shall be clipped together and filed as a unit. The Engineer's Bell Book shall be maintained at all times when the propulsion plant is not secured, even when the propeller shafts are not turning. When ordered to secure the propulsion plant, that order, at the time of completing the last operation required to secure the propulsion plant, shall be written down. As an example: **Secured main engine and engaged jacking gear.** Details of securing should be listed in the Engineering Log. If a propeller shaft is rotated by any means other than propulsion plant power, such as by dragging or jacking, that event, the time of starting and complet-

ing the event, and changes in propeller shaft RPM, if any, shall be recorded in the Engineer's Bell Book. For gas turbine ships, if both the Automatic Bell Logger and the Automatic Data Logger are not recording, the Engineer's Bell Book shall be kept.

090-2.2.2.1.3 The Engineer's Bell Book sheets shall be preserved as a permanent record onboard except in obedience to a demand from a Naval Court or Board, or from the Navy Department. In that case a copy, preferably photostatic, of such parts of the record as may be sent away from the ship shall be prepared and certified by the Engineer Officer as a correct copy for ship files. Bell Books may be destroyed 3 years after the date of the last entry. When the ship is stricken, the current books must be forwarded to the nearest Naval Records Management Center.

090-2.2.2.2 Engineering Log. The Engineering Log is a record of engineering system status and operational events on surface ships and submarines. Status information is recorded in the log daily and operational events are recorded at the time they occur.

a. For surface ships, Engineering Log Form NAVSEA 3120/2A through 2D (10-81) is applicable. Form NAVSEA 3120/2A is the cover sheet, one of which is filled in for each month. Form NAVSEA 3120/2B is the status and operational events sheet, which is filled in daily. Form NAVSEA 3120/2C is the continuation of sheet 2 and is filled in daily as required. Form NAVSEA 3120/2D contains the instructions for filling in the log form.

b. For nuclear submarines, Engineering Log Form NAVSEA 3120/11 (8-82) (a two-sheet form) is applicable. The front of sheet 1 is the status sheet and contains the instructions for filling in the form. Status information is filled in daily. The back of sheet 1 is the operational events sheet, which is filled in at the time the events occur. Sheet 2 is the continuation sheet for operational events and is filled in daily as required.

c. Nonnuclear submarines use NAVSEA Form 3120/2A through 2D (10-81), except that draft headings need not be recorded in the log.

d. The original engineering log, neatly prepared in ink or pencil, is the legal record. The EOOW should prepare the remarks for the log and should sign them prior to being relieved at the end of each watch or duty day. Any errors should be overlined and initialed by the person preparing the original entries. The Engineer Officer shall verify the accuracy and completeness of the entries and sign the log daily. The Commanding Officer shall sign the log on the last calendar day of each month, and on the date of relinquishing command. The Engineering Log shall be preserved as a permanent record onboard except in obedience to a demand from a Naval Court or Board, or from the Navy Department. In that case, a copy, preferably photostatic, of such sheets as may be sent away from the ship shall be prepared and certified by the Engineer Officer as true copies for the ship file. Engineering Logs may be disposed of in accordance with SECNAVINST 5212.5, **Disposal of Navy and Marine Corps Records.**

e. Previous Engineering Log Forms NAVSEA 3120/2 (9-77) and NAVSEA 3120/2A (9-77) are superseded by NAVSEA 3120/2A, 3120/2B, 3120/2C, and 3120/2D (10-81) for surface ships and by NAVSEA 3120/11 (8-82) for nuclear submarines.

090-2.2.3 OPERATING RECORDS. Data recorded on operating records ensure frequent observation of the machinery by the watch-standers and provide the basis for performance analysis. Such records shall be examined daily by the Division Officer and the Engineer Officer, as appropriate. The Commanding Officer shall review all boiler water, feedwater, and condensate treatment records on a monthly basis. The form number and title of operating records to be maintained are given in Table 090-2-1. Operating records maintained on other standard forms shall not be destroyed. Data continuity shall be maintained.

090-2.2.4 MAINTENANCE RECORDS. The following maintenance records shall be kept.

090-2.2.4.1 Storage Battery Tray Record. In compliance with **NSTM Chapters 223, Submarine Storage Batteries,** and **313, Portable Storage and Dry Batteries,** a complete record (NAVSEC 9620/2) shall be maintained for each storage battery tray in the ship.

090-2.2.4.2 Storage Battery Records (Submarine Only). In compliance with **NSTM Chapter 223, Submarine Storage Batteries,** a complete record shall be maintained for each main storage battery in the ship.

090-2.2.4.3 Powerboat Engine Service Records. Materiel history on powerboat engines is provided through MDS, which keeps the service records of all powerboat and small landing craft engines.

090-2.2.4.4 Ground Test Records. Ground tests shall be made in accordance with the requirements of PMS and any required readings shall be maintained in the materiel history.

090-2.2.5 ACCOUNTS. Maintenance of current accounts of quantities and locations of critical material aboard, such as fuel, diesel oil, lubricating oil, and fresh water is indispensable. Forms and procedures shall be prescribed by Operational Commanders. Paragraphs 090-2.2.5.1 through 090-2.2.5.4, describe such accounts.

090-2.2.5.1 Daily Fuel Account. Fuel account changes and notations (receipts, users, expenditures, transfers, inventory changes, apparent meter errors) shall be recorded daily for each fuel tank in the ship. This record constitutes the daily fuel account.

090-2.2.5.2 Daily Diesel Oil Account. The daily diesel oil account is comparable to the daily fuel account.

090-2.2.5.3 Daily Water Account. The daily water account is comparable to the daily fuel account but is applicable to potable fresh water and to boiler feedwater.

090-2.2.5.4 Daily Lubricating Oil Account. The daily lubricating oil account is comparable to daily fuel account, but is applicable to lubricating oil. It may be combined with the fuel or diesel oil account when the number of tanks is small.

090-2.2.5.5 Fueling Memorandum. A fueling memorandum shall be prepared by the Engineer Officer whenever fuel, diesel oil, or lubricating oil is received or transferred. The memorandum shall be sent to the OOD, the Supply Officer, other interested parties (if any), and, in the case of transfers, to the fueled ship. As appropriate, the memorandum should include information such as:

a. Ship (or station) supplying or receiving fuel

b. Contract numbers

c. Times fueling began and ended

d. Amount received or transferred (expressed in the equivalent amount of fuel at 15.6°C (60°F)

e. Fuel analysis

f. Average pumping temperatures

g. Drafts or displacements before and after fueling.

090-2.2.5.6 Oil King's Memorandum. The Oil King's memorandum is a report to the Engineer Officer (copies to the EOOW) concerning fuel and feedwater suction and standby tanks. The report shall include soundings of all reserve feed tanks during each watch. This report is primarily suited to large ships, but the Engineer Officer and the EOOW in all ships will maintain a close check on fuel and water distribution and suctions. The Oil King's memorandum may also supply data needed for the daily fuel, lubricating oil, and water accounts.

Table 090-2-1 OPERATING RECORDS REQUIRED BY NAVSEA

Form* Number	Title
NAVSEA 3120/1	Engineer's Bell Book
NAVSEA 3120/2A	Engineering Log Title
NAVSEA 3120/2B	Engineering Log (Surface Ships and Non-nuclear Submarines)
NAVSEA 3120/2C	Engineering Log Continuation
NAVSEA 3120/2D	Engineering Log Instructions
NAVSEA 3120/11	Engineering Log Nuclear Submarines
NAVSEA 9221/6	Boiler Room Operating Record - All Steam Propelled Ships
NAVSEA 9221/8	Fireroom Operating Record (FF-1052-1097)
NAVSEA 9230/2	Engine Room Operating Record (FF-1052-1097)
NAVSEA 9231/1	Propulsion Steam Turbine and Reduction Gear Operating Record
NAVSEA 9231/2	Diesel Engine Operating Record
NAVSEA 9235/1	AC/DC Electrical Propulsion Operating Record, Surface Vessels
NAVSEA 9255/4	Feedwater Chemistry Worksheet/Log
NAVSEA 9255/6	Water Treatment Log (Cover Sheet)
NAVSEA 9255/7	Waste Heat Recovery Boiler Water Chemistry Worksheet/Log
NAVSEA 9255/8	Boiler Water Chemistry Worksheet/Log
NAVSEA 9255/9	Fuel and Water Report
NAVSEA 9255/10	Reserve/Makeup Feedwater Tests Log
NAVSEA 9255/11	Auxiliary Boiler Water Chemistry Worksheet/Log
NAVSEA 9255/12	Trend Analysis Graph, Type B Propulsion Boiler
NAVSEA 9255/13	Trend Analysis Graph, Type A Propulsion Boiler
NAVSEA 9310/1	Ships Service Turbine Generator
NAVSEA 9320/1	Submarine Battery Record Book
NAVSEA 9400/1-11	Marine Gas Turbine Equipment Service Records
NAVSEA 9530/1	Flash Type Distilling Plant Operating Record
NAVSEA 9530/2	Vapor Compression Distilling Plant Operating Record
NAVSEA 9530/3	Low Pressure Distilling Plant Operating Record
NAVSEC 9590/1	Refrigeration/Air Conditioning Operating Record
NAVSEA 9600/1	Electrical Log - Ship's Service Electric Plant
NAVSEC 9600/3A	Submarine Electrical Operating Record - Propulsion
NAVSEC 9600/3B	Submarine Electrical Operating Record - Temperature/Pressures
NAVSEC 9620/2	Storage Battery Tray Record
NAVSEC 9626/1/2/3	Submarine Battery Log
NAVSHIPS 9880/2	Compartment Check-Off List, Damage Control

*These printed forms may be procured by submitting DD1348, DOD Single Line Item Requisition, to the nearest Navy Forms and Publications Supply Office. Forms are revised frequently to meet the needs of the Service as it is desirable to use standard forms suitable for all ships, rather than forms specifically appropriate for one type or class ship. The use of the forms may be customized: only applicable columns should be filled in. Headings and blank columns may be adapted to specific ships.

090-2.2.5.7 Daily Boat Fueling Record. It is recommended that a routine record of daily powerboat fueling be maintained, particularly by ships carrying or maintaining a large number of boats. Operating boats shall be fueled daily whether or not the fuel tank soundings require it. Adoption of such a schedule will prevent special fuelings at unusual hours and ensure readiness for unexpected calls. Recommended column headings of such a record are:

a. Boat number

b. Fuel capacity in gallons

c. Gallons on-hand

d. Approximate fuel consumption in gallons-per-hour

e. Operating hours of fuel remaining

f. Whether or not fueled to capacity.

090-2.2.6 MISCELLANEOUS RECORDS. The following miscellaneous records are recommended.

090-2.2.6.1 Engineer Officer's Night Order Book. The Engineer Officer's night order book contains standing and special instructions given by the Engineer Officer to the night EOOW. To facilitate the preparation of the night order book, it may be printed with spaces for certain routine entries such as boiler-engine combinations, standard speed, and principal auxiliary units.

090-2.2.6.2 Steaming Orders. The steaming orders report is a routine form listing the various machinery units and readiness requirements of the Engineering Department based upon the time set for getting underway. Normally it includes the major machinery to be used, times of lighting-off, cutting-in of boilers and spinning of main propulsion turbines, cutting-in of the ship service generators, and standard speed. The report is prepared by the EOOW and leading Petty Officers-of-the-Watch. The early posting of such orders is essential in getting a large plant underway with minimum confusion.

090-2.2.6.3 Warming-Up Schedule. The warming-up schedule is a chronological checkoff of the key steps in warming up the plant for getting underway. The scheduled times of the respective steps, relative to the time to report ready, shall be printed on the form, and the corresponding required and actual clock times shall be entered in pencil. The routine use of such a checkoff (even with experienced personnel) ensures that the operation is carried out according to schedule.

090-2.2.6.4 Securing Schedule. It is important that a chronological checkoff of the key steps in securing the plant (comparable to the warming-up schedule) be established. The use of such a schedule ensures that the plant is properly secured and overcomes the normal tendency of watchstanders to secure too quickly. It also lists the auxiliary machinery units to be used at anchor. On ships using the Engineering Operational Sequencing System (EOSS), documentation provided with the system shall be used in sequential securing of the propulsion machinery plant.

090-2.2.6.5 Fuel and Water Tank Diagram. In large ships, it is recommended that a printed or mimeographed diagram showing tank layout be prepared. Each day, a copy (with date and time indicated) shall be marked to show graphically the quantity of fuel, ballast water, reserve feedwater, or potable water in each tank. A daily record of this type is invaluable to the Damage Control Officer, Engineer Officer, EOOW, and Chief Oil King for use in damage control, fueling, and major changes in liquid loading.

090-2.2.6.6 Trouble Call Record. In large ships, it is recommended that daily records be maintained of trouble calls; this record shall list the time received, nature of problem, person(s) assigned to correct problem, and time completed. Such records provide information about unusual maintenance problems and ensure that service calls are handled properly.

090-2.2.6.7 Ship Service Telephone Directory. The ship service telephone directory is important to ensure quick access to personnel when immediate communication is necessary.

090-2.2.6.8 Engineering Department Route Slip. An engineering department route slip, by indicating personnel to receive circulated documents, ensures that all cognizant personnel are informed on operations and problems.

090-2.3 DEPARTMENTAL PERSONNEL RECORDS

090-2.3.1 GENERAL. In addition to the ship (or type) organization book and Watch, Quarter, and Station Bills, the following departmental personnel records are recommended for large ships.

090-2.3.2 DEPARTMENT ORGANIZATION CHART. The department organization chart is a diagram of the officer and enlisted personnel allowed and assigned to each division and station by ranks and ratings.

090-2.3.3 PERSONNEL QUESTIONNAIRE. The personnel questionnaire contains selected information relative to the experience, training, specialties, and preferences of personnel. Such records assist in proper placement within the department and often disclose unusual talents and skills.

090-2.3.4 PERSONNEL SUMMARY CARDS. A personnel summary card contains official service information extracted from the service record; it includes full name, service number, rating, date rated, division assignment, ship or station from which received, date received, service schools attended, general classification mark, miscellaneous qualifications, and leave record.

090-2.4 SAFETY PRECAUTIONS AND OPERATING INSTRUCTIONS

090-2.4.1 The Commanding Officer is responsible for issuing safety precautions and operating instructions and for ensuring that all personnel are familiar with them. Preparations and instructions shall be posted in conspicuous places in the ship. These records reiterate standing safety precautions and anticipate advisable safety precautions and operating instructions for new construction and conversion ships, for ships in commission and in-service, and for ships completing reactivation. Precautions and instructions shall be in the form of plates and placards suitable for posting. The Commanding Officer shall provide necessary guidance on placement and installation.

090-2.4.2 The foregoing responsibility is assigned by NAVMATINST 5100.6 to the Naval Sea Systems Command (NAVSEA) in conformance with OPNAVINST 5100.8. Additional guidance is provided in OPNAVINST 5100.19, **Navy Safety Precautions for Forces Afloat.**

090-2.4.3 When unforeseen conditions arise, or when safety precautions or operating instructions are considered inadequate, the Commanding Officer will issue such additional instructions as he considers necessary and advise NAVSEA and the appropriate administrative and Operational Commanders on the premises.

090-2.4.4 For safety precautions pertaining to electronic equipment, see **NSTM Chapter 400, Electronics;** for electrical equipment, see **NSTM Chapter 300, Electric Plant-General.**

090-2.5 FILES AND PUBLICATIONS

090-2.5.1 In addition to the correspondence files, the following files and publications shall be kept up to date:

a. Drawing files (drawings will be distributed to ships in accordance with information given in **Chapter 080, Publications and Drawings**
b. CNO instructions relative to materiel matters
c. Fleet regulations and fleet instructions relative to materiel matters
d. Type Commander's instructions relative to materiel matters
e. Type Commander's alteration and improvement program
f. Engineering Department instructions and notices
g. The NAVSEA Journal
h. Naval Ships' Technical Manual **(NSTM)** , including individual chapters for instruction purposes
i. NAVSEA allowance lists
j. Engineering Department Casualty Control Book
k. Custody records
l. Latest inventory records including record and location of repair parts and equipage
m. Electronics installations sheet
n. Machinery system and equipment technical manuals or instructions books
o. **Ships' Maintenance and Material Management** (3-M) Manual (OPNAVINST 4790.4)
p. PMS files
q. EOSS documentation for applicable ships
r. Ship Information Book
s. Damage Control Book
t. **Navy Safety Precautions for Forces Afloat** (OP NAVINST 5100.19).

SECTION 3.

REPORTS

090-3.1 RECURRING REPORTS

090-3.1.1 In various chapters, the Naval Ship's Technical Manua l (NSTM) calls for recurring reports pertaining to ship and submarine equipment. The appropriate report symbols or exemption statements are indicated in each

chapter. The operating records required by the Naval Sea Systems Command (NAVSEA) are specified in Table 090-2-1. For these records to be meaningful, they shall be transformed into reports on which future operational and management decisions can be made.

090-3.2 SPECIAL REPORTS

090-3.2.1 Various required special reports are presented in OPNAVINST 5214.1, **Consolidated List of Recurring Reports Required by Washington Navy Headquarters Organizations from the Operating Forces of the Navy.** An example would be a special report to NAVSEA on unusual corrosion (this report would also be recorded in the ship Maintenance Data System (MDS). The extent of corrosion, type of corrosion, and preventive measures taken would be included.

090-3.2.2 Normally, Type Commanders consolidate all recurring reports required from their subordinates and distribute them as a Type Commander's Instruction.

090-3.3 EQUIPMENT FAILURE REPORTS

090-3.3.1 Equipment failures are reported under the MDS in accordance with OPNAVINST 4790.4, except that NAVSEAINST C9210.13 applies for nuclear propulsion equipment on surface ships and submarines.

090-3.4 PLANNED MAINTENANCE SYSTEM FEEDBACK REPORT (TFBR)

090-3.4.1 Fleet personnel use the PMS Feedback Report (TFBR), OPNAV Form 4790/7B, to notify NAVSEACENS or the Type Commanders on matters or problems related to the PMS. Detailed information regarding TFBR types, categories, and processing procedures is contained in OPNAVINST 4790.4 volume I.

REAR SECTION

NOTE

TECHNICAL MANUAL DEFICIENCY/EVALUATION EVALUATION REPORT (TMDER) Forms can be found at the bottom of the CD list of books. Click on the TMDER form to display the form.